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A FEASIBILITY STUDY FOR A JOINT COMPUTER CENTER FOR FIVE WASHINGTON, D.C. UNIVERSITY LIBRARIES.

BY- PARKER, RALPH
CONSORTIUM OF UNIVERSITIES OF METRO.WASHINGTON,D.C

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THIS STUDY WAS CONDUCTED TO DETERMINE THE ECONOMIC FEASIBILITY OF A JOINT COMPUTER CENTER AND TO ANALYZE THE POTENTIAL FOR SUCH A CENTER TO BECOME PART OF LONG RANGE PLANS FOR REGIONAL AND NATIONAL COMPUTER NETWORKS. IT WAS FOUND THAT THE BASES FOR FRUITFUL INTERLIBRARY COOPERATION WITHIN THE CONSORTIUM ALREADY EXIST, IT IS NECESSARY TO CREATE TOOLS FOR LOCATING MATERIALS, THE LIBRARY OPERATIONS ARE LARGE ENOUGH AND THERE IS SUFFICIENT DUPLICATION OF MATERIALS AMONG THE LIBRARIES TO JUSTIFY USE OF A JOINTLY OPERATED COMPUTER SYSTEM FOR RECORD KEEPING FUNCTIONS, AND NEW TECHNIQUES AND DATA SOURCES IN MACHINE READABLE FORM ARE INCREASING THE POTENTIALITIES OF COMPUTERS IN LIBRARIES. FOUR ALTERNATIVES ARE PROPOSED--(1) AN APPROACH INVOLVING INDEPENDENT ACTION BY EACH LIBRARY, EXCEPT FOR CIRCULATION RECORDS, IS NOT RECOMMENDED, (2) A JOINTLY OPERATED SMALL TO MEDIUM SIZE COMPUTER, TO BE OPERATED IN BATCH MODE WITH BASIC RECORDS MAINTAINED ON TAPES, IS RECOMMENDED FOR IMPLEMENTATION AT THIS TIME, (3) ALTHOUGH NOW TOO COSTLY, A SOPHISTICATED SYSTEM INVOLVING MASSIVE ON-LINE STORAGE AND USE OF REMOTE TERMINALS SHOULD FOLLOW THE ABOVE SYSTEM, AND (4) A SYSTEM INVOLVING A CENTRAL FACILITY FOR STORAGE OF LITTLE USED MATERIAL AND CAPABILITY OF FACSIMILE TRANSMISSION IS RECOMMENDED FOR RESTUDY IN ANOTHER DECADE. A LIST OF THE CONSORTIUM UNIVERSITIES IS APPENDED. THIS STUDY WAS CONDUCTED UNDER A GRANT FROM THE COUNCIL ON LIBRARY RESOURCES TO GEORGETOWN UNIVERSITY. (JB)

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A Feasibility Study for a Joint Computer Center for Five Washington, D.C. University Libraries

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FINAL REPORT

Dr. Ralph Parker,

Project Investigator

LI 000 509

Consortium of Universities of Metropolitan Washington, D. C.

May, 1968

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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FOREWORD

The use of modern computer technology to serve the needs of libraries has generally been directed toward the solution of problems on the highest and lowest levels of library activities. On the lowest level libraries have been using automation for a number of years to help solve day by day problems of access, control and organization in their own libraries. On the highest level there have been few developments, some experimentation, and much talking and planning about computer controlled state, regional and national library networks.

But in the rapidly expanding middle level of local library cooperation relatively little planning and experimentation have taken place to determine whether the computer can serve effectively groups of libraries which are geographically closely knit. There are hundreds of such library groupings throughout this country - most of them situated so as to be capable of direct daily access or easily connected by a daily delivery service.

Many of these local groups, spurred to some extent by the joint use funding possibilities of Title IIA of the Higher Education Act of 1965, are currently exploring avenues of cooperation. They are finding that meaningful cooperation is related to a number of variable factors. Perhaps the most important of these factors are the depth of the cooperative spirit motivating the participating librarians, the tangible benefits which are expected and the direct economic considerations involved. Cooperative ventures involving substantial financial contributions by the individual libraries must be justified in terms of measurable mutual benefits, whether in the form of expected long range savings, added services or better exploitation of common resources and facilities.

Several years ago the Washington, D.C. Consortium librarians, in discussing their own individual automation plans, raised the question: how could their individual efforts in automating internal procedures be planned to abet and facilitate their cooperative efforts in sharing resources and coordinating their collection building? From this question there followed logically another question: could a joint computer center fill the automation needs of individual libraries better than the general use computer centers of each institution? In exploring these questions they found that they were unable to supply certain necessary data about their own operations which would be required before answers could be given to the original questions.

In agreeing to the need for a feasibility study for a joint computer center to facilitate and extend their joint use activities the librarians recognized the technological feasibility of such a center. Their concern was for its economic feasibility. What short and long range benefits could automation offer to cooperation and what would be the cost?

They were also interested in finding out what the potential was for such a center in tying in with long range plans for regional and national computer networks. They were concerned particularly with the promise that such a center might have in utilizing most effectively the output of the Library of Congress's Marc Project.

This study has not answered all of their questions, but it has provided some essential data on which to make basic decisions. It has also given a sound base for further studies. It is expected this report will prove of interest to other local library groups who might be posing the question of how best to evaluate the promise of the computer in terms of their own co-operative endeavors.

The Consortium Librarians are grateful to Dr. Parker for taking the time from his heavy schedule to undertake this study. They are also deeply grateful to the Council on Library Resources for providing the funds which made this study possible.

Joseph E. Jeffs
Project Coordinator

FEASIBILITY STUDY FOR
A JOINT COMPUTER CENTER
FOR FIVE WASHINGTON, D. C.
UNIVERSITY LIBRARIES

Final Report

I. BASES FOR LIBRARY COOPERATION

Librarians are committed to the principle of cooperation. Among academic libraries there were proposals for cooperative ventures long before the other parts of their institutions expressed any interest. Even today, whenever there are discussions of inter-institutional cooperative agreements, the library is usually mentioned as one of the more productive areas. Most cooperative arrangements between libraries are based upon the sharing of resources through formal interlibrary loan, or through the granting of borrowing privileges to the clientele of all of the institutions.

The efficacy of resource sharing agreements is based upon two implicit assumptions: the first, that libraries are not alike; the second, that some books are used more than other books. A corollary is that the holdings of any one library which are distinctive are likely to be lesser used and therefore available for use by the clientele of the other libraries. Although the assumption of unused capability has never been conclusively established, the pragmatic experiences of the past tend to validate it. The success of any library operation is dependent upon the immediate availability of a needed book in a high percentage of cases; it is logical to assume that books at the lower end of the demand curve can serve a wider community of users than those near the upper end.

The problems of interlibrary cooperation relate largely to the difficulties of bibliographic access. To solve these problems, two tools are usually created: a union card catalog of the cooperating libraries, and a printed union list of serials owned by them.

The National Union List of Serials, which dates back to 1927, is of course well known, but it often does not satisfy local needs, particularly because smaller institutions are not included but also because of the infrequency of revisions or supplements. The numerous regional and local union lists which have resulted have, in general, proven to be the most fruitful interlibrary cooperative effort. The list can be reproduced in book form and distributed widely enough to give effective bibliographic access to a significant segment of the resources of the participating libraries.

The union catalog of books has traditionally been a card catalog, but because of its great volume in relation to the amount of material controlled, duplication of it for use in many places has been a rare occurrence. The National Union Catalog, which has been the most useful of

all such undertakings, is only now in the process of being printed in book form and distributed widely. Because of the size of the undertaking, most union catalogs have been main entry lists only. Therefore each participating library has been required to maintain the bibliographic apparatus necessary to identify the author and title of the work needed, before the union catalog could be utilized.

An alternative to the union catalog which has been used recently in a number of places, particularly under the leadership of a state library, has been the teletype network. The efficacy of such an approach is based upon the assumption that, given quick communication, a considerable expense can be borne to locate each needed book not held in a library, rather than supporting the costs of repeated recordings in the union catalog of materials held in common by the participants in order to answer simply the infrequent request for the unique title.

The limitations of these tools of access have resulted in the sharing of largely fortuitous holdings without any effective planning for cooperative acquisitions. The enforcement of a program of non-acquisition of a book held by a participating library is difficult enough if the fact of its ownership can be easily determined. To ascertain the status of each title prior to ordering it under existing circumstances is so cumbersome that such arrangements generally break down of their own weight.

Technologies becoming available to libraries are adding new dimensions to the potential for cooperation. Computer-based bibliographic records and the potential for telecommunication between computers offer opportunities for more effective cooperation between libraries in the future. The simplification of the problem of bibliographic access will occur over a period of time in several ways. First will be the capability of reproducing bibliographic records, both union lists of serials and union catalogs of books, to make them more current and more readily available to the persons who need access to the materials of the participating libraries. Later the development of on-line bibliographic record systems with a variety of telecommunication terminals will make the records of all libraries accessible to all potential users.

When it becomes possible for the staff of any one library to know not only the books held by the other participating libraries but also those in the process of being purchased, effective planned cooperative acquisitions programs can be instituted. But computer communication will not solve the problem of the mathematics department on campus A insisting upon duplication of a book held on campus C, even though the probability of use may be less than once a year.

Most significant, however, will be the cooperative advantages to be achieved from the similarities between the associated libraries, in contrast to the present limitation of advantages in cooperation to the dissimilarities. The effort and cost of adding the records of a book are now repeated over and over by each institution which acquires it. If it were possible to achieve a common system for cataloging and indexing materials and to take advantage of the automatic aspects of a computer bibliographic system, the cataloging cost of that portion of a library's collection which is common to the other participating libraries would be essentially eliminated. Fortunately, developments in both the computer technology and in systems design are bringing this capability nearer to fruition.

At this time no operational computer-based cataloging system has been developed to cope with the problems of interlibrary cooperation; there are a number in the discussion or developmental stage, including the New England State Universities, Pittsburgh Area Universities, and Ohio Colleges. The potentialities of such a pioneering effort led the librarians of the Consortium to initiate this feasibility study.

II. BACKGROUND INFORMATION

The five members of the Consortium of Universities of Metropolitan Washington share many of the same characteristics. All are privately controlled, all have a high proportion of graduate students, a large percentage of whom are working in professional fields. Two of the schools, Catholic University of America and Georgetown University, are Roman Catholic in affiliation; American University is related to the Methodist church. George Washington University is non-sectarian and completely private in its control. Howard University is technically a private institution but derives much of its support from Congressional appropriations and is subject to limited supervision by the United States Office of Education.

In the school year 1966-67 almost fifty thousand individuals were enrolled. Meaningful figures on full-time equivalents are not easily arrived at. But there is a significant proportion of part-time students, particularly in the graduate and advanced professional programs. At George Washington University, for example, there were 2,206 full-time graduate students and 3,582 part-time.

Fewer than half of the 9,377 degrees granted were at the bachelor's

level. Catholic University, which is primarily a graduate institution, awarded 961 advanced degrees, including 137 doctorates of philosophy. (TABLE I)

Financially, the schools have much in common. Total expenditures for educational and general purposes in 1966-67 (TABLE II) varied from slightly more than $12,000,000 for Catholic University up to almost $29,000,000 for George Washington University. Total expenditures for the five institutions was $96,000,000. If the very large sponsored research operations at George Washington ($12,029,367) and Georgetown ($9,975,888) were excluded, the totals for each of the universities would be within a very close range.

There is greater disparity in the libraries than in the total educational expenditures for the universities themselves. In number of volumes and microtext units held, the variation is from 237,825 at American University to 729,258 at Catholic University (TABLE III). Next in size above American University is George Washington University Library with 440,278. Only recently has the library of American University begun a rapid growth, and at present its rate of acquisition is greater than any of the other member institutions.

Library expenditures for 1966-67 (TABLE IV) totaled $3,164,882, representing 3.3% of the total educational and general expenditures for the five universities. Individual institutional totals varied from $419,000 at American University to $986,000 at Howard University. Georgetown and George Washington universities each expended slightly less than $200,000 for books, periodicals, and binding; American and Catholic universities slightly more than $200,000. The regular book funds for Howard University were in the neighborhood of $250,000.

A note of explanation is needed regarding the Howard University figures, however, since an intensive program for development of the medical-dental library included special funds for purchase of library books and journals. There was also special emphasis on developing the law library. A note of explanation is also necessary regarding Catholic University Library because it maintains a bindery department, whereas the other institutions rely entirely on commercial binding. To make the data comparable, $52,158 for salaries of the bindery department is included in the book fund figure of $213,367.

There was a full-time equivalent of 373 persons on the library staffs of the five universities (TABLE V). These figures include 110 professional librarians. Staff size varies from 36 at American University

TABLE I

ENROLLMENT AND DEGREES GRANTED, 1966-1967

University	Enrollment (Individuals)	Degrees Bachelors	Professional	Masters	Doctoral
American	13,900	1,016	169	484	65
Catholic	6,591	702	-	824	137
George Washington	13,162	1,100	473	1,706	68
Georgetown	7,480	825	424	275	48
Howard	8,813	622	301	127	11
Total	49,946	4,265	1,367	3,416	329

TABLE II

INSTITUTIONAL EXPENDITURES
FOR EDUCATIONAL AND GENERAL PURPOSES, 1966-1967*

University	Amount
American	$14,487,330
Catholic	12,799,072
George Washington	28,979,548
Georgetown	24,869,843
Howard	15,038,681
Total	$96,174,474

*Includes organized (sponsored) research, but excludes hospital operation.

TABLE III

TOTAL VOLUMES AND MICROTEXT UNITS IN LIBRARIES, 1967

Library	Printed Volumes	Microtext	Total
American	224,600	13,225	237,825
Catholic	704,331	24,927	729,258
George Washington	437,340	2,938	440,278
Georgetown	534,136	134,909	669,045
Howard	533,622	38,959	572,581
Total	2,434,029	214,958	2,648,987

Note: Each physical unit of microtext is counted as one: reel of microfilm, microcard, microfiche, microprint.

TABLE IV

LIBRARY EXPENDITURES, 1966-1967

Library	Salaries	Books	Other	Total
American	$182,952	$204,387	$32,592	$419,931
Catholic	448,609*	213,637	57,127	719,373
George Washington	285,386	189,929	29,275	504,590
Georgetown	315,053	196,093	23,435	534,581**
Howard	430,334	497,496***	58,577	986,407
Total	$1,662,334	$1,301,542	$201,006	$3,164,882

*Salaries of $52,158 paid in Bindery Department included with books, periodicals, and binding.

**Does not include data processing services, estimated at $23,600; covered by budget for Data Processing Center.

***Medical-Dental Library $203,958; Law Library $72,127.

Note: American University excludes law.

TABLE V

LIBRARY STAFF, 1967*

Library	Professional	Sub-Professional and Clerical	Student FTE	Total
American	11	19	6	36
Catholic	36	45	20	101
George Washington	15	24	23	62
Georgetown	19	32	33	84
Howard	29	38	23	90
Total	110	158	105	373

*Includes all libraries on each campus

to 101 at Catholic University.* It will be observed that the proportion of professional staff in all of the libraries is quite low, particularly in George Washington and Georgetown, where it is less than 25%.

The average salary paid to the library staff is $4,560, varying from the high of $5,080 at American University to a low of $3,750 at Georgetown. The actual salaries paid for each class of employee is probably not significantly different between the institutions, but Georgetown University operates at this low average salary level by reason of its unusually low percentage of professional staff (22.6%) and its high utilization of student assistants (40%).

Of particular significance to this feasibility study is the staff effort devoted to the processing of new acquisitions. It proved to be difficult to obtain data on the autonomous branch libraries, because of the small staffs which devoted only part time to processing. The data presented in TABLE VI and TABLE VII relate only to those library units under administration of the chief librarians. There were 104.6 staff positions on a full-time basis involved in all aspects of technical services. Of these, 38.5 were professional; 51.8, clerical; and 14.3, student assistants. American University and Catholic University utilized practically no students in technical services operations. During the year 1966-67, there were 105,429 volumes and microtext units acquired and processed by the central libraries of the five institutions. During this same period, the libraries reported cataloging 55,801 separate titles.

For the five institutions, the average number of volumes processed per man-year of staff involved was 1,008. Variation between libraries was from in excess of 1,780 volumes per man-year at American University to 600 volumes at George Washington University.

There appears to be a serious backlog of uncataloged older gift materials in several of the libraries. All report that current requests for material are ordered promptly and that most books are cataloged within a reasonable time span after receipt. Although there is a continued rate of acceleration in acquisitions, there has been during the past five years an appreciable increase in the number of volumes not cataloged in only one institution.

There has been an interest in automation of various portions of library processing in all institutions. Georgetown University Library is using data processing techniques in conjunction with its circulation

*Included in this figure is the staff of the binding department.

TABLE VI

PERSONNEL INVOLVED IN TECHNICAL SERVICES (CENTRAL)

Library	Professional	Clerical	Student	Total
American	6.0	9.0	0.0	15.0
Catholic	11.0	12.0	0.8	23.8
George Washington	6.5	12.5	3.0	22.0
Georgetown	8.0	8.0	6.5	22.5
Howard	7.0	10.3	4.0	21.3
Total	38.5	51.8	14.3	104.6

TABLE VII

CENTRAL LIBRARY PROCESSING OUTPUT 1965-1967

Library	Volumes Processed*			Titles Cataloged
	1965-66	1966-67	Total	1966-67
American	25,560	26,728	52,288	16,380
Catholic	17,736 (298)	22,770 (739)	40,506	9,736
George Washington	11,277 (65)	12,545 (123)	23,822	6,728
Georgetown	22,630 (6,593)	22,986 (6,351)	45,616	9,075
Howard	20,714	20,400	41,114	13,882
Total	97,917	105,429	203,346	55,801
Staff	(All Processing)	104.6	(Cataloging)	50.5
Vols./man year		1,008		
Titles/man year				1,105

*Microtext units included in totals are shown in parentheses where data were available.

work and is studying acquisition and serials applications. American University is using data processing equipment in its circulation work, in reserves and serials, and is studying acquisitions. Catholic University was one of the pioneers in use of Flexowriters for catalog card production.

The very existence of the Consortium indicates that inter-institutional cooperation is desirable. Within the libraries there are already concrete accomplishments in the implementation of significant cooperative arrangements. First is the publication of the Union List of Serials in the Libraries of the Consortium. This work, undertaken through the leadership of Catholic University, is most significant because it provides a tangible evidence of accomplishment. The first edition, although incomplete, has proven its worth and demonstrates the magnitude of problems which will be faced by the cooperating libraries. The second concrete development is the regular delivery of books between the member libraries. A third is the agreement on coverage of reference books which assures that at least one of the member libraries will acquire each title in Winchell's Guide to Reference Books.

It is projected that in the near future direct access to all member libraries will be made available to all doctoral students. At present, materials are available to this group, as to other students, through inter-library loan. The recent announcement (Washington Post, February 29, 1968) of the extension of inter-school enrollment to certain undergraduates will result in further increase in direct access to the resources of the entire Consortium.

Interviews with the academic and financial administrators of the universities revealed uniform support for and enthusiastic interest in the furtherance of resource sharing by the universities in the field of libraries as well as in other fields. The chief librarians of all the universities are deeply committed to sharing their limited resources and pooling their efforts in order to strengthen the libraries and the library services for which they are responsible. The reaction of members of the library staff was one of confidence that cooperative efforts could succeed.

III. ANTICIPATED PROBLEMS IN COOPERATION

Any assessment of the feasibility of a cooperative project must take into account the variations in philosophies, goals, and practices of the member institutions. In the early stages, these differences are quite easily glossed over, but they must be faced head-on at the time of

implementation. There has been some attempt in this study to evaluate the problems which can be anticipated from within the five libraries.

On the other hand, there is a category of potential problems which are not controllable from within the library and which may prove to be the more serious. These derive from the lack of coordination in teaching and research programs among the participating universities. To the extent that the teaching and research departments are not able or willing to limit and mold curricula, it is impossible for the libraries to implement cooperative acquisition programs which allocate primary responsibility in certain subject specialties to individual institutions. Problems which may arise in this area will have to be resolved at the highest administrative level of each institution.

There lurks in the background the possibility of difficulties of including the autonomous libraries which exist on each of the five campuses. The law libraries and the medical libraries, which in all cases are autonomous, and a variety of other libraries in the same category, are in some cases further from the central library in readiness for uniformity of practice than are the central libraries as related to the other institutions. It may well be necessary to limit the consideration of inter-institutional cooperation at this time to those elements of the library which are under the direction of the chief librarians. Again, this is a decision which must be made at the highest administrative level.

Considerable attention was given in this study to the uniformity of practice in the technical service operations of the participating libraries. There is a high degree of uniformity in cataloging and an expressed willingness to make modifications which would be required for a cooperative processing code.

It is not absolutely necessary that there be uniformity between the participating institutions in every detail, but every variation increases the complexity of the system and hence increases the cost. If the matter of cost is a determining factor in any particular system proposed, then the variations in practice may be responsible for the ultimate decision.

Fortunately, all institutions are very close together in their descriptive cataloging practices, since variations of this type will cause the greatest difficulties in implementation of central processing systems. There are, however, a number of variations which if continued would make maintenance of a common bibliographic record extremely complex and expensive. The variations indicated below are not necessarily all that exist but are the most significant ones discovered in conferences

with the various library staffs.

At Catholic University Library, works by members of religious orders are assigned entries at variance from the normal Library of Congress entry. These entries include the identification of the order, and in case of a nun the insertion of the word Sister before the first name. This means that either the other institutions must accept this form of entry for all such books, whether owned by Catholic University or not, or that a complex system must be developed to indicate that a different main entry is to be used when preparing records for Catholic University. If Catholic University is the first purchaser of such a book, it would have to provide for both the standard main entry and the alternate entry for its own use. If the book were first acquired by one of the other institutions, it might be cataloged under the standard form without awareness of the special situation. In this case, when acquired by Catholic University it would be necessary to alter the already existing record by the addition of the alternate main entry.

At Howard University a similar situation exists for books by Negro authors. The fact of Negro authorship is indicated in the main entry; and if a book is by two authors, of which the second is a Negro but the first is not, the sequence of authorship is reversed in the catalog. The consequence of these alterations is identical with that of the entries for books by members of religious orders at Catholic University.

There are two variations of significance at American University. The frequency of occurrence of these variations is probably quite low, however. Under standard procedure, publications of governments where the official language is not English are entered with the name of the country translated into English but with the name of the governmental department in the original language. Thus, a publication of the German foreign office would be entered as Germany. Auswartiges amt. At American University the name of the governmental agency is translated into English for non-western languages for all entries, and for all languages for subject entries. Unless all institutions accept the American University practice, it would be necessary again to provide an alternate entry applicable only to American University records. In any case, if the cataloging of the Library of Congress is to be utilized, this variation from Library of Congress practice would mean local alterations of these records and the reviewing of entries of all books in order to catch such possible alterations.

The other variation at American University is the use of the original imprint including publisher, place, and date of books reproduced by facsimile, even though the reprinted edition contains a new title page

with the imprint of the reprint agency. Handling of this variation may not be particularly difficult if the standard machine readable bibliographic record being developed at the Library of Congress is approved as now projected. There is provision in this record to show both the original date of publication and the reprint date, so that the using library might select whichever it chooses.

Pointing out these variations is not to be construed as indicating that the practices should be discontinued. If the alterations are essential for the purposes of the collections to which they apply, the common system must be sufficiently flexible to accommodate them.

The subject cataloging practices appear to be uniform with one major exception. At Catholic University the Kapsner special list of subject headings adopted by the Catholic Library Association is used for books in theology. Either adoption of this list for all libraries, or provision in the system for alternative headings to be supplied by a library for its own use, is required. It would not be necessary for other institutions holding the same books to be concerned about the use of an alternate heading, as long as the standard heading assigned by the Library of Congress was included in the common records.

Four of the five institutions use the Library of Congress classification system. Howard University uses the Dewey Decimal System, although it has modified this system in certain respects in some of its special collections. A change at Howard University to conform to the practices of the other universities would certainly simplify the system required, which would benefit all members but would be of particular value to Howard. Without going into detail on the technical requirements, the use of two classification systems lengthens the computer record which must be stored and increases the complexity of modifying an existing record when a library using a different classification system acquires the same title.

The situation regarding circulation procedures is considerably different from that in the area of cataloging and classification. There are wide variations in the rules under which materials may be issued and in privileges to various classes of borrowers. The records which are maintained are unique in each case. It is not essential, however, that rules and regulations be uniform in order for reciprocal borrowing privileges to be extended; but borrowers would have to become familiar with the rules and regulations of the lending library. If borrowers from one university are to be permitted to borrow books directly from others, it would be convenient if there could be a universally acceptable identification card.

Another class of problems will also need to be considered. If a computer-based cooperative bibliographic system is established, and after all of the design problems are resolved, it can be anticipated that during the period of implementation unexpected and unpredictable problems will arise. It is almost impossible to design and program a system as complex as the one which would be required, without failures to anticipate some infrequently occurring situations and without errors. These will cause delays and perhaps voluminous errors in records. It is almost certain that such problems would occur frequently during the first year of operation, and it might be two years before the systems could be working smoothly. Patience on the part of all library staffs concerned, on the part of the faculty and student users of the library, and on the part of the top administration of each university will be required.

IV. AREAS OF FEASIBILITY

The nature of interlibrary cooperative efforts is determined by the extent of similarities between the participating libraries. If the contents of each library were completely distinct from the contents of all the other participating libraries, cooperative undertakings would be limited to the sharing of resources which were of common interest. At the other extreme, if the contents of all libraries in the project were identical there would be no need for resource-sharing, and the only type of joint endeavor which would have value would be in the synchronization of acquisitions and the creation of identical catalog records. Obviously, neither of these situations is likely to exist, so that a knowledge of the extent of commonality and of uniqueness is essential to planning effective joint undertakings.

Analysis of samples drawn from each of the participating libraries is a reasonable method of ascertaining the relationships between them. Two types of samples immediately suggest themselves. In one, the sample would consist of books of all ages, and would seek to determine the number of titles now in the collections unique to each library, and the number held in common with one, two, or three, or four other institutions. The second type involves the sampling of recent publications to determine whether current policies are consistent with those which led to creation of the libraries as they exist today.

There are certain difficulties in the use of either of these types of samples. One is establishing a valid sample of workable size; a generalized list of publications for use by all institutions might result in such a low yield that the list would have to be inordinately long to yield

statistically reliable results. Lists chosen from the actual holdings or recent acquisitions of each individual library, if used alone, would mean the inability to relate the result to a composite whole.

It is quite obvious that emphases change and that many of the volumes in a well-established library are infrequently used and thus have less significance for other institutions than do those volumes which are likely to be heavily used. A sample of recently published books, covering a period of two years or perhaps even longer periods, might not reveal the full measure of duplication of acquisitions because of differences in the criteria used for book selection and hence the time delay between publication and acquisition.*

To overcome as many of these problems as possible, the following technique was used in this study. Each of the five libraries was asked to make a random selection of 200 titles acquired during the period July 1, 1965, through June 30, 1967, without reference to date of publication of the title. The method of selecting the sample from each library was determined by the surveyor in conference with the appropriate staff in each library. In some cases, the file consisted of order slips in accession number sequence; in others, the order slips were arranged by main entry. In one library, the selection was made from new book lists which were essentially in call number sequence.

A sample of 200 titles, excluding serials, was drawn for each library. Publication dates varied from 1941 to 1967. If the item which would normally have been drawn turned out to be a volume of a serial, the next item was included in the sample. Preliminary data had been gathered to ascertain the number of non-serial volumes added by each of the libraries during the two years being studied. The percentage which the additions of a library bore to the total additions of all libraries was applied to the sample of 200. The result was the number of titles to be selected from the sample of 200 for use in a new composite sample of 200 titles. Thus, a library which acquired books equal to a rate of 24% of the total acquisition rate of the five libraries was represented in the sample by 48 titles.

When each of these five samples was drawn, slips were assembled in alphabetical sequence; only one duplicate was found. The second slip

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*For a discussion of the sampling technique used in a similar study, see William R. Nugent, "Statistics of Collection Overlap at the Libraries of Six New England State Universities", Library Resources and Technical Services, vol. 12, pp. 31-36.

for the duplicate title was removed and replaced by another randomly-drawn slip from the same library. The assembled list of 200 titles, which was representative of the acquisitions of the composite group, was typed and duplicated for checking by all five libraries. In checking, it made no difference when the library had acquired the title concerned.

It can be assumed that an estimate of the amount of duplication accurate to within 10% would suffice. The formula for calculation of the size of sample which would yield these results is:

$$n \geq pq \frac{x^2}{d^2}$$

where p and q are the percentage probability of success and failure, x is the root of the normal distribution for P = .99 (the confidence level of 99%), and d the percentage discrepancy allowed. The result is 135; therefore the selected sample of 200 should produce results well within the limits required.

It was assumed that analysis of this sample would reveal the effect of current acquisitions on the libraries as they exist today. Having drawn the sample from all libraries, the results should be valid in ascertaining the effects which the acquisitions of each institution would have on the resources of the group, with emphasis on composite resources rather than upon the individual library.

It was essential to handle serials separately because of the fact that some of the participating libraries do not catalog serials in the same way that they do books. The existence of the Union List of Serials of the Consortium made it possible to approach the problem in a different manner. The Union List indicates whether a title is currently received, and only those titles being currently received by one or more of the libraries was considered for the sample. The technique was to select from each page to be sampled the first title which was recorded as being currently received by a library. Again, a sample of 200 titles was drawn. The data regarding each title, including the institutions receiving it, were recorded on slips for later analysis. Unlike the book samples, where a recent acquisition in one library might be of material held for many years in another, only current issues of serial publications were considered. Casual observation indicates that holdings tend to be rather incomplete, but since the implications of these scattered holdings are not particularly significant to the scope of this study, no attempt was made to study the backfile holdings of those titles currently received.

Analysis of the book sample (TABLE VIII) shows that American

TABLE VIII

BOOKS REPORTED BY ONE OR MORE LIBRARIES 1965-1967

Reported by	Percent of the total	Percentage also reported by: American	Catholic	G. Washington	Georgetown	Howard
American	57.5	--	47.0	43.5	50.5	36.5
Catholic	47.0	57.5	--	41.5	50.0	39.5
George Washington	32.5	77.0	60.0	--	54.0	49.0
Georgetown	50.0	58.0	47.0	35.0	--	34.0
Howard	37.0	57.0	51.5	43.0	46.0	--

Source: Sample of 200 titles selected from books received July 1, 1965 to June 30, 1967

This table is to be read as follows:

> Of the books recently received by one or more of the libraries, American University held 57.5%; of these, 47% are duplicated in Catholic University, 43.5% in George Washington, etc.

University had 57.5% of the titles, while George Washington University owned only 32.5%. Rate of acquisition at George Washington University being much lower would tend to cause that institution to have fewer of the sample titles. More significant than the percentage of the total sample reported by each institution is the percentage of items duplicated between the various pairs of institutions. Although American University is the smallest of the five libraries, its current acquisitions contain the highest rate of duplication with the other four libraries, and Howard University shows the lowest. For example, of the titles acquired by Catholic University, American University held 57.5%, but Howard University only 39.5%. Of the titles reported by George Washington, American University held 77% and Howard University held 49%.

The similarity between American University book acquisitions and the other institutions may well reflect the present state of development as much as any inherent difference between that library and the others. It has probably not yet acquired the common core of materials which had previously been acquired by the other libraries. Their common holdings resulting from acquisitions in years past would not be reflected in the sampling technique used. A wider dispersal of its acquisitions can probably be expected within the next few years as its basic needs are met.

Of the 200 titles in the sample (TABLE IX) 77 were unique to the Consortium. This figure is quite significant in assessing the feasibility of a cooperative processing center. Of the 200 titles in the sample, duplication of acquisition between the member institutions meant that there were actually 448 physical volumes, each of which had to be acquired and cataloged by the owner. In other words, on the average, every title acquired by the participating libraries is cataloged 2.24 times.

While the unique titles represent 38.5% of all titles, they represent only 17.1% of the physical volumes. On the average, only one out of each six books on the shelves of a particular library is unique among the Consortium members; stated in another way, five out of each six volumes acquired merely duplicate resources already present in some other library. Actually, the percentage will be somewhat higher because analysis of the samples assume that there is only one copy of each book in any one library. This, of course, is not the case.

Data relating to serials are far less dependable than those relating to books. Definition of the term "Serial" varies from institution to institution. In some, only those publications which are usually called

TABLE IX

A. DUPLICATION OF TITLES HELD IN SAMPLE OF 200 BOOK TITLES

Frequency	Titles	Percent	Volumes (f x t)	Percent
Unique	77	38.5	77	17.1
2 Copies	45	22.5	90	20.1
3 Copies	40	20.0	120	26.8
4 Copies	29	14.5	116	26.0
5 Copies	9	4.5	45	10.0
Total	200	100.0	448	100.0

Ratio: Volumes/Titles = 448/200 = 2.24

B. DISTRIBUTION OF 77 BOOKS RECEIVED BY ONLY ONE LIBRARY

Library	Number	Percent of Unique Titles	Percent of Titles Received by Library
American	23	30.0	20
Catholic	17	22.0	18
George Washington	3	4.0	14
Georgetown	22	28.5	22
Howard	12	15.5	16
Total	77	100.0	

This table is to be read as follows:

> American University held 23 (30%) of the sample book titles received by only one library; these represent 20% of the sample book titles reported by American University.

periodicals are included in the figures in TABLE X, in others the more inclusive meaning of serials, which includes any publication which is issued in parts and planned for continuation indefinitely, is used. Thus, both the information on the number of serials received and the contents of the Union List of Serials in the Libraries of the Consortium are of limited usefulness for inter-institutional comparisons. The cooperative efforts of the five libraries are resulting in improvement of the data.

Despite these limitation, analysis of the serial sample taken appears to be worthwhile. There is apparently less duplication of serials than there is of books. Of the 200 titles in the sample (TABLE XII), 119 or 59.5% are unique, and the unique sets represent almost one-third (32.6%) of all serial volumes held by the member institutions. The average amount of duplication is 1.87 copies per title, as compared to 2.24 for books. There is a much larger proportion of unique serial titles, but at the other extreme there are relatively more serial titles held by four or five institutions than in the case of books.

Although the samples of both book and serial acquisitions indicate distinguishing differences between the five libraries and that each makes a contribution to the total resources available through unique purchases, most significant is revelation of the high degree of identity between the libraries. Member libraries reported that 55,801 aggregate titles were cataloged by the five libraries in 1966-67. Since the average amount of duplication is 2.24 copies per title, the number of titles acquired and cataloged which had not previously been cataloged by some other member was only 24,910. The remaining 30,891 titles had already been cataloged, and any effort expended by member libraries in creating the necessary catalog records was largely wasted. With new techniques at hand, most of the duplicated cataloging work can be eliminated or at least completed as an automatic by-product of the purchasing procedure.

Maximum benefits in a cooperative acquisition and processing system would result from simultaneous ordering of all copies of a book or periodical which is to be duplicated. A single purchase order, one payment, and one handling would suffice whether two or five copies were acquired. Unfortunately this situation cannot be anticipated in most cases. But study should be given to use of selection criteria and methods which would lead to as much simultaneous selection as possible.

TABLE X

SERIAL TITLES CURRENTLY RECEIVED, 1967

	Central Administration	Total
American	4,400	7,800
Catholic	4,660	*
George Washington	2,265	4,465
Georgetown	4,307	6,010
Howard	5,733	8,106
Total	21,365	

* statistics not available

TABLE XI

DUPLICATION AMONG LIBRARIES
OF SERIALS CURRENTLY RECEIVED, 1967

Received by	Percent of the total	Percentage duplicated in: American	Catholic	G. Washington	Georgetown	Howard
American	34	--	47.0	41.0	56.0	44.0
Catholic	44	36.5	--	30.5	42.0	34.0
George Washington	30	46.5	45.0	--	50.0	40.0
Georgetown	45.5	42.0	40.5	33.0	--	29.5
Howard	29.5	52.5	51.0	42.5	47.5	--

Source: Sample of 200 titles selected from Union List of Serials

This table is to be read as follows:

> Of the serial titles currently received by one or more of the libraries, American University receives 34%; of these, 47% are duplicated in Catholic University, 41% are in George Washington University, etc.

TABLE XII

A. DUPLICATION OF TITLES AND AGGREGATE SETS IN SAMPLE OF 200 SERIALS

Frequency	Titles	Percent	Sets (f x t)	Percent
Unique	119	59.5	119	32.6
2 Copies	38	19.0	76	20.9
3 Copies	15	7.5	45	12.4
4 Copies	15	7.5	60	16.2
5 Copies	13	6.5	65	17.9
Total	200	100.0	365	100.0

Ratio: Sets/Titles = 365/200 = 1.87

B. DISTRIBUTION OF 119 SAMPLE SERIALS RECEIVED BY ONLY ONE LIBRARY

Library	Number	Percent of Unique Titles	Percent of Titles Received by Library
American	14	12	21
Catholic	36	30	41
George Washington	17	14	28
Georgetown	33	28	36.5
Howard	19	16	32
Total	119	100	59.5

This table is to be read as follows:

American University receives 14 (12%) of the 119 serial titles received by only one library; these represent 21% of the titles received by American University.

V. POTENTIAL PATTERNS OF COOPERATION

A broad spectrum of possibilities of cooperation is available, ranging from the most ambitious undertaking to little more than is being done at the present. In this study, four different possibilities, all based upon some extension in the use of computer facilities for library management, will be outlined.

In arriving at a decision as to the type of cooperative effort which should be undertaken, the factors of cost in relation to the ends to be achieved should have considerable weight. Insofar as there is duplication of ownership between the participating libraries there should be the potential of reducing cataloging costs. At the present rate of duplication it is probable that the number of titles to be cataloged could be reduced by more than 50%. The saving in operating cost from this reduction should therefore be applied to the creating of a new common tool which would make the unique holdings of any institution bibliographically accessible to other institutions. It is doubtful that the new system to be devised could be financed entirely from the increased efficiency in the use of personnel in technical services. The present staff now has an average output of 1,000 volumes per man; even if this output could be increased to 1,400 volumes per man, the personnel savings would be no more than $200,000. It is hardly conceivable that any cooperative system could create and maintain a union catalog available to all of the libraries for this cost.

Without computer operation or other radical departure in processing methods, a single processing facility for the five institutions should be able to reduce the cataloging work load by about 25%. This is based on the assumption that preparing a set of catalog cards for a title in one library, where it had already been cataloged for another, would require approximately half the time of the first cataloging operation of the title. With the potentialities from data processing techniques, the staff effort in providing cataloging records for second and subsequent locations would be significantly reduced, but would be offset in part economically by the increased equipment cost.

First Alternative

A minimal program might consist essentially of continuation and intensification of current activities in each institution, with each providing its own equipment and creating its own records. An attempt to gain compatibility between the five operations to facilitate exchange of magnetic tapes or other machine readable records would be mandatory. With uniform

cataloging policy and with the same format of a bibliographic record, it would be possible to create a union card catalog.

In fact, two alternatives would be available: (1) by generating an extra set of cards, the joint catalog could be located at some convenient place available to all potential users; (2) by creating four extra sets of cards, the catalogs of all institutions could be available on each campus. As attractive as the second may sound, the costs in space and card filing might well prove prohibitive. Even though the first alternative would probably require a staff to maintain the catalog and to answer telephone inquiries, it would probably be more economical than the second.

To maintain the single catalog, with all added entries, would probably require a staff of three filers and a supervisor. In the beginning, this staff could probably handle telephone inquiries. At least five sixty-drawer catalog cases would be needed each year, so that labor and equipment costs might well run to more than $25,000 annually. The cost of producing the extra set of cards would be in addition.

A somewhat more modest beginning might be the creation of the catalog only for future acquisitions. An even more modest program might include only the reference books; but if adopted, the project should include the present collections as well as future additions.

Another project in the limited approach would most certainly be the creation and maintenance of a supplement to the Union List of Serials. The automated techniques available should be utilized to make card records for all additions to the serial record, which would be promptly distributed to each library. This supplement in card form would be discarded each time a new edition of the Union List appears.

It can be anticipated that catalog records of new books will become available on a fee basis from the Library of Congress. The MARC project will probably be operational some time in 1968, and according to current plans will be made available on magnetic tape. Although inconvenient, it should be possible for each of the participating libraries to share a single tape; if not, the cost might well negate the advantages which would otherwise accrue to this source for automated creation of catalog cards.

Each library would also plan its own circulation system. Rules, regulations, even layout of book cards could vary from school to school. If the systems are to be based on data collection devices, identification cards should be compatible between universities to avoid the difficulties

TABLE XIII

CIRCULATION, 1966-1967

UNIVERSITY	CENTRAL LIBRARIES		DEPARTMENT LIBRARIES	
	Regular	Reserve	Regular	Reserve
American	65,232	40,025		
Catholic	87,945	18,106	37,428	5,714
George Washington	145,379	66,026		
Georgetown	119,386	27,241		
Howard	137, 518	16,975		

of issuance of special cards for each library to those users entitled to direct access.

Because of the nature of circulation records, and on the basis of current circulation statistics, it appears that no advantages would accrue from development of joint circulation records or from use of the proposed joint computer processing center for control of circulation records.

Second Alternative

The second alternative program is more ambitious; it would provide for a joint computer facility, which would perform complete central processing including ordering and cataloging. Because of legal restrictions on the Consortium, it would be necessary for the joint facility to be independent of any one of the institutions, and located off any campus.

An IBM System 360 Model 25 or a Model 30, with a central processing unit of some 24,000-48,000 characters, or another make of similar capacity, would suffice. TABLE XIV is a suggested configuration and estimated machine costs. Personnel costs would depend in large degree on whether the input would all occur in the member libraries or at the center. On the assumption that the bibliographic records input to the system, except that available on tape, would be handled at each library, the central personnel would be something as follows:

	Rate	Total
1 Director	$20,000	$20,000
1 Systems Analyst	17,500	17,500
1 Librarian (Information Specialist)	15,000	15,000
4 Programmers	7,000 to 11,000	36,000
1 Secretary	6,000	6,000
2 Keypunch Operators	5,000	10,000
2 Unit Records Machine Operators	6,000	12,000
3 Computer Operators	7,000	21,000

If machines are to be purchased the cost would be approximately $600,000, with maintenance service costing about $40,000 per year. On the basis of computer rental, the annual cost for machines, space, supplies, personnel, and fringe benefits would be in the neighborhood of $325,000.

Under this option, it would not be necessary to convert all old records immediately, but conversion could be scheduled as experience proved it desirable. Catalogs in each library would continue to be on

TABLE XIV

COMPUTER CONFIGURATION FOR INITIAL OFF-LINE SYSTEM

UNIT	DESCRIPTION	ANNUAL RENTAL
2025 E	Processing Unit (32K)	$ 30,720
6960	Selector Channel	1,800
4598	Integrated 2311 Attachment	4,440
2311	Disk Drives (4)	28,320
2415 M3	Magnetic Tape (6)	20,460
1403 M2	Printer, with controls	15,000*
2540	Card Read Punch	11,460
1052	Console Typewriter	780
	Unit Record Equipment: Card Punches, Verifiers, Sorter, Collator	24,000
Total		$ 136,980

* Does not include cost of chain cartridge with expanded character set.

cards, with new cards created via the computer, but the data would be cumulated on magnetic tape for creation of book-form supplements including additions to all libraries. These supplements would become the vehicle for making the combined resources available to all users.

The system proposed would be capable of handling the anticipated increase in acquisition rate over the present level of activity for a number of years, without significant increase in operating costs. The facility would make it possible for a coordinated acquisition and cataloging operation to be established for each institution, taking full advantage of the proposed availability of MARC II tapes from the Library of Congress.

Operation would be somewhat as follows: Each individual library would probably submit to the central agency finder cards giving the Library of Congress card number, the account to which an item should be charged, the estimated cost, the dealer from which it should be ordered, the branch library or unit for which it should be cataloged. From these data purchase orders would be created in the form required by the originating library. Each library would be provided with an in-process file in the form of a computer print-out, which would show the materials on order and those received but not yet cataloged. The system would also provide all accounting records which might be required.

The books would be delivered by the supplier directly to the library which ordered them; upon arrival, a card identifying the item would be sent to the processing center to trigger the creation of the necessary catalog records. Cards and other records needed by the individual library would be created, and the holdings of the member library would be updated in the union catalog on magnetic tape.

Full implementation of the system would require at least two years. For the first year the budget would be not more than $75,000 or $80,000, most of which would be spent for planning personnel. The director and a secretary should be followed by the systems analyst and the information specialist. Gradually the programmers would be added; the equipment operators would not be added until arrival of the equipment near the end of the second year. The second year costs might be expected, if implementation occurred on schedule, to reach $125,000 or $150,000.

The annual cost of this program ($325,000) would be approximately 10% of the present cost of library operations ($3,164,000). Except that the volume of library activity is increasing, some reduction in costs at

each library might be expected. But it should be assumed that the cost of the center operation is an advance payment on more and better service.

Third Alternative

The third alternative available to the Consortium is the creation of a massive computer facility which would provide a complete processing service for all additions to the member libraries, with on-line catalogs, remote terminals, and multiprogramming capabilities. The concept of this facility is compatible with the emerging outlines of national or even international bibliographic networks connecting libraries with each other, with the book trade, and with other related groups. At this point of time, the functions of these networks will be essentially administrative rather than devoted to mechanized information retrieval. Until much more basic research is done and development effort has been made, traditional methods of retrieval are both more effective and more economical.

In this conception of the bibliographic system, the bibliographic center serving a number of libraries would utilize large-scale computers with massive random access storage and with necessary peripheral equipment and communication linkages. In turn, each institution would be connected to the computer facility by a number of terminals with the number and type of each determined by the peculiar needs and wishes of the institution. Through these terminals, individuals at the member library could inquire as to the location of any book, either by author or by title, or could ask for a search of the file for all books on any subject, defined as narrowly as the subject indexing system provides.

The joint facility could either provide for centralized cataloging, or for decentralized cataloging but centralized recording. A staff member in the institution could, under proper circumstances, enter new information into the mass storage device or alter details in records already stored. Thus, under proper control, it would be possible for material received in any one of the participating libraries to be cataloged there and for the cataloging to be recorded in the joint catalog of the center. In either case, uniformity of practice among the participants is essential to efficient operation unless elaborate provisions are made for individual institutional variation.

Such a central computer facility would probably provide printed indexes of portions of the collections of each institution which would be needed for the high-frequency-use materials. Reliance on terminal inquiry for all consultation of the catalog would probably be more expensive than could be justified. It would be possible, of course, for the

computer center to prepare catalog cards for each of the member libraries, but it is quite probable that if such a system were instituted the card catalog would be replaced by bookform catalogs and indexes of selected materials in each of the libraries, with reliance on the electronic mass-stored catalog for less frequently needed consultation.

TABLE XV lists the equipment which would probably be required for an installation to handle the present and immediate future needs of the Consortium libraries. This IBM System 360 Model 50 is only one of a number of makes of computers which could be utilized for this purpose. It was selected because all of the institutions utilize IBM equipment and it is probably more generally known than any of the other makes. The costs are, for planning purposes, representative of what any system would cost. It is possible that some educational discount might be obtained if the organization is set up to take advantage of manufacturing discount policies, but any discounts might well be offset by additional features and peripheral equipment which are not provided in the list.

The equipment as detailed is capable of real-time operation and of time-shared batch operations via terminals. Neither the terminals themselves nor the control units necessary for linking them with the computer are included in the cost. Control units would probably be about $2,000 per month; the terminals themselves might cost as little as $50 per month up to more than $200 each.

The purchase price of equipment detailed in TABLE XV would probably exceed $2,000,000. Unless massive outside support could be obtained, purchase appears to be out of the question.

Although the hardware exists for implementation of this truly automated library records system, there is little experience to assist in the development of operating systems. The systems design and programming would be a mammoth undertaking and would probably require the investment of several hundred man-years, costing at least $2,000,000. In consideration of the investment in systems, it would be foolish not to convert the records of present library holdings to the new system. A moderate estimate of this cost would be an additional $2,000,000.

The annual salary cost would be approximately $155,000; fringe benefits would add another $20,000. Computer rental would be $400,000. Only poor estimates can be made as to costs for overhead, including space rental, electricity, and the like, but it would be at least $25,000. Neither can adequate estimates be made of supplies without detailed knowledge of what records would be prepared centrally and what records

TABLE XV

COMPUTER CONFIGURATION FOR ON-LINE SYSTEM

UNIT	DESCRIPTION	ANNUAL RENTAL
2050 H	Processing Unit (262 K)	$ 169,980
6980-1	Selector Channels (2)	17,280
1052	Console Keyboard and Adapter	3,564
2501	Card Reader (1000 cpm)	3,960
1442	Card Punch	4,500
2821	Control Unit	7,440
1403	Printer, with adapters	13,224*
2841	Storage Control (2)	12,960
2311	Disk Drives (5)	35,400
2321	Data Cells (2)	69,240
2401	Tape Units, with control (4)	35,520
2671	Paper Tape Reader, with control	4,320
	Unit Record Equipment: Card Punches, Verifiers, Sorter, Collator	24,000
	Total	401,388

* Does not include cost of chain cartridge with expanded character set.

would be prepared by each institution on its own terminals. A conservative estimated cost of the terminals and their operating personnel in the member libraries is $150,000 per year. These figures would include individuals to input data at each library, but not operators inquiring for data from the catalog. Thus the total annual cost would be at least $750,000 for an adequate on-line system. The annual operating cost of $750,000 represents approximately 25% of the present annual investment in libraries of the member institutions. Reductions in cost of current operations through the automation of procedures of the new system probably would not offset this cost more than $100,000 and certainly by not more than $200,000. It would be difficult at this time to justify this increase in expenditures in terms of improvement of services to be expected. When the time comes that the larger system can be economically justified, either through increases in activities, changes in machine costs, or expansion to include other libraries, conversion from the former off-line system could be made with little loss of prior programming and planning.

Fourth Alternative

The fourth possibility combines the powerful computer based system described as the third alternative with the creation of a central facility to serve all institutions in the Consortium. Since it can be assumed that the percentage of unique titles in the combined holdings of the member libraries will increase as the adequacy of their existing collections is improved, it might appear logical to house these unique lesser-used materials in a central facility located on the basis of transportation and favorable land cost. Interest in such a facility, particularly if it could be associated with an effective facsimile transmission system for high priority items, was expressed by a number of individuals in interviews during the study. The rationale of this concept is the same as that which led to the creation of the Center for Research Libraries in Chicago. It assumes that each institution will develop a library complex which will meet, let us say, 95% of the institutional needs.

Bibliographic accessibility of its contents as well as physical accessibility must be provided to all five institutions. The problems of bibliographic accessibility would be identical with those discussed in the third alternative. Provision of physical accessibility for the next few years would have to rely almost entirely on a system of deliveries of either the original material or of photo-facsimiles of it. Tele-facsimile transmissions are still in their infancy and, if any meaningful volume of transmission is to take place, are both slower and more expensive than physical deliveries. The experimental installation at the New York State

Library, for example, has a transmission rate of approximately one page each three minutes from a single transmitter; but the image to be transmitted must have been copied in advance from the bound volume to a single sheet. Thus, in a 24-hour period, fewer than 500 pages could be transmitted over a single line. Truck delivery of the intermediate image which must be used to generate the tele-facsimile could be made more expeditiously, bypassing the tele-facsimile system completely.

A central storage facility, with catalog records of the traditional type, might become advantageous without consideration of a computer information system. But such a project is not within the purview of this study.

VI. SUMMARY

1. The bases for fruitful inter-library cooperation within the Consortium already exist.

2. The library needs of the five universities are similar enough, and the collections are different enough, for fruitful sharing of library resources.

3. To make the resources readily accessible for sharing, it is necessary to create tools for learning the location of materials.

4. The library operation is of sufficient size to justify utilization of computers in such record keeping functions as circulation, ordering, and cataloging.

5. New techniques and new data sources in machine readable form are increasing the potentialities of computers in libraries.

6. There is sufficient duplication of materials among the libraries to produce savings in record making and maintenance with a jointly operated computer system.

7. Four alternatives are proposed:

   (1) The first involves more or less independent action on the part of each library. Except in the area of circulation records, this approach is not recommended.

   (2) The second involves a jointly operated small to medium sized computer, to be operated in batch mode with basic records maintained on tapes. This approach is recommended for implementation at this time; at least two years would be required to make the system operational.

   (3) The third is a much more sophisticated and powerful system than the second. There would be massive on-line storage, use of remote terminals for input to records, and for consultation of files such as catalogs. The cost, both in planning and of operation, is too great to be recommended at this time, but could follow natural growth from (2).

   (4) The fourth would involve also creation of a central facility for storage of little used material, and capability of facsimile transmission to each member institution. It is neither technologically nor economically feasible at this time, but in another decade it should be restudied.

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APPENDIX

THE CONSORTIUM UNIVERSITIES

American University

Founded in 1893 by Methodist Bishop John Hurst, American University today retains its close relationship to the Methodist Church. It serves some 13,900 students in seven schools. This includes 4,989 full time, 2,862 part time, 5,454 non-degree students, 496 law students and 99 special students. In these totals are included 775 full time and 1,942 part time graduate students. It has a faculty of 330 full time and 307 part time members. In June, 1967 65 doctoral degrees, 484 master degrees, 1,016 bachelor degrees, 9 two year degrees and 169 law school degrees were awarded.

Catholic University of America

Catholic University was founded in 1889 by the Bishops of the U.S. and today is governed by a Board of Trustees made up of 15 lay and 15 clerical members, including all the Cardinals of the U.S. and other selected representatives of the American Bishops. It is primarily a graduate school with graduate degrees usually comprising about 70% of those awarded each year. Its present faculty totals 446 full time and 240 part time members. Student enrollment totals 6,591, of which 4,022 are graduate students. In June, 1967 137 doctoral, 824 master, and 702 bachelor degreer were awarded from 13 schools and institutes.

George Washington University

The George Washington University is a private non-sectarian institution chartered by Congress in 1821. Organized under 9 schools and colleges it has an enrollment of 6,694 full time and 6,468 part time students of which 2,206 are full time and 3,582 are part time graduate students. These are served by 667 full time and 981 part time faculty members. In June, 1967 the University awarded 68 doctoral, 2179 master and 1100 bachelor degrees.

Georgetown University

Founded in 1789 by the members of the Society of Jesus, Georgetown University today remains under the auspices of the Jesuit fathers, although it has recently added a number of laymen to its Board of Directors. In its 10 schools and colleges it enrolls 6,505 full time and 976 part time students. This includes 1001 full time and 460 part time graduate students. Its faculty consists of 672 full time and 861 part time members. About one of 17 faculty members is a Jesuit. In June, 1967 it awarded 48 doctoral, 275 master, 474 professional and 1,622 bachelor degrees.

Howard University

Howard University, although a privately controlled institution, is supported to a very large extent by the Federal Government of the United States. Founded in 1867 it now enrolls 7,376 full time and 1437 part time students. This student body is served by 10 schools staffed by 593 full time and 422 part time faculty members. In June, 1967 the University awarded 11 doctoral, 127 master, 301 professional and 622 bachelor degrees.